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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/549,340	09/13/2005	Takayuki Abe	114/75034	6716

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NEW YORK, NY 10036

EXAMINER

CWERN, JONATHAN

ART UNIT	PAPER NUMBER
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3737

MAIL DATE	DELIVERY MODE
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01/15/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/549,340

Applicant(s)

ABE ET AL.

Examiner

Jonathan G. Cwern

Art Unit

3737

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 November 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3 and 5-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3 and 5-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
- Paper No(s)/Mail Date _____.

- 4) ☐ Interview Summary (PTO-413)
- Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-3, and 5-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mistretta et al. (US 5713358) in view of Ho et al. (US 2002/0087069).

Mistretta shows, means for dividing k space into high repetitive-frequency areas containing the origin and low repetitive-frequency areas not containing the origin (column 7, line 65-column 8, line 65), signal processing means for reconstructing an image using the k space data (column 8), a display (column 5, lines 20-40), labeling the

time period of the sampled data so that it can be used to reconstruct the image (column 8, lines 25-40), reconstructing the image using the high frequency area measurement and a low frequency area measurement which are close in time (column 8 line 45-column 9, line 15); a lower frequency area is measured immediately after a high frequency area (column 8); all of k space is sampled (column 8); k space data is data of concentration information for a contrast medium injected into a blood vessel (column 10); k space comprises a slice encode direction, a phase encode direction, a readout direction, and k space is divided by a plane parallel to the readout direction (columns 7 and 8); projection processing on a two-dimensional plane after three-dimensional reconstruction (column 10, lines 30-50);

Mistretta fails to show, comparing a time phase evaluation value with a predetermined threshold value; controlling the measurement sequence so that the high frequency area contains the time phase; predicting the timing from the time change of the time phase evaluation value, controlling the measurement sequence based on the timing predicted; determining the time phase after the measurement repetitions; the time phase value is a peak value of the k space data; the time phase value is a value of data which has been fourier transformed; the threshold value is at least 1.8 times the baseline value of the time phase evaluation value; the threshold value is at least 80% of a maximum value of the time phase evaluation value; display has means for setting the threshold value, designating the time phase, selecting each measurement area; displaying the time phase evaluation value in a time series, a signal intensity change curve, a measurement sequence of the measurement areas, differing display of each

measurement area selected from those not selected; and a time phase value is a value in which an artery is emphasized by contrast agent.

Ho teaches, comparing a time phase evaluation value with a predetermined threshold value ([0037]-[0041]); controlling the measurement sequence so that the high frequency area contains the time phase (high frequency areas are also acquired with the same steps, [0045]-[0048]); predicting the timing from the time change of the time phase evaluation value ([0037]-[0041]), controlling the measurement sequence based on the timing predicted ([0037]-[0041]); determining the time phase after the measurement repetitions ([0037]-[0041]); the time phase value is a peak value of the k space data (the value is when the contrast agent enters the region of interest, the presence of the contrast agent will increase the value so that it is at its highest point, a peak [0037]-[0041]); the time phase value is a value of data which has been fourier transformed ([0029]); the threshold value is at least 1.8 times the baseline value of the time phase evaluation value (the threshold is preselected by the user, and so it can be selected to be any value, [0040]); the threshold value is at least 80% of a maximum value of the time phase evaluation value (the threshold is preselected by the user, and so it can be selected to be any value, [0040]); display has means for setting the threshold value, designating the time phase, and selecting each measurement area (the system is operator controlled, by any of various input devices, so that the operator could control any of these variables, [0026]); displaying the time phase evaluation value in a time series, a signal intensity change curve, a measurement sequence of the measurement areas, differing display of each measurement area selected from those

not selected (a display will be capable of displaying any of these images, [0026]); and a time phase value is a value in which an artery is emphasized by contrast agent ([0037]).

Mistretta mentions labeling the time periods during which the k space data is obtained, and using the time periods to reconstruct the data at a later time. However, he does not go into further detail on how this is accomplished. Ho describes in detail how a threshold can be used to mark the time periods during which data is acquired. It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to have used a threshold to mark the time periods during which data is acquired, in the system of Mistretta, with the motivation that marking the time of the data acquisition will aid in reconstructing the high and low frequency areas, so that image will be easier for the physician to evaluate.

Response to Arguments

Applicant's arguments filed 11/9/07 have been fully considered but they are not persuasive.

In regards to applicant's argument that Ho does not involve changing the predetermined sequence, while repeating measurement of the measurement areas, of each of said measurement areas in such a manner that a measurement period of said high repetitive frequency measurement area contains said time phase, examiner respectfully disagrees. First, by changing the start timing of the measurement sequence, Ho does in fact meet the claim limitation which states: "said measurement control means changes the predetermined measurement sequence of each of said

measurement areas in such a manner that a measurement period of said high repetitive-frequency measurements contains said time phase". The arterial phase is specifically mentioned for example in paragraph [0051], the arterial phase being a measurement period during which high repetitive-frequency measurements contain the time phase. In addition, in paragraph [0055] Ho describes moving the patient table so as to chase the bolus. The acquisition time is changed on-the-fly based on the passage of the contrast bolus. Therefore the system will change the measurement sequence based on the speed of the bolus, tracking the bolus during the arterial phase.

In regards to applicant's arguments that the cited art does not disclose selecting the high and low areas as an image reconstruction set, examiner respectfully disagrees. As stated in the previous non-final rejection, Mistretta et al. clearly show that an image is reconstructed using data from a central k-space region and temporally adjacent data from the surrounding peripheral k-space regions (column 8, line 45-column 9, line 15). One method described is using the data acquired from peripheral regions closest in time to the acquisition of the central k-space region. Each image frame data set depicts the subject at a particular time during the study. Ho et al. also disclose combining high and low spatial frequency data sets to reconstruct an image of the arterial vasculature ([0053]). In addition, in applicant's specification, on pages 18-19, applicant submits that this is a known technology disclosed in JP-A-2002-177240, dividing k-space into high and low frequency areas and then using the data for image reconstruction.

Therefore the previous rejection dated 8/9/07 is upheld and repeated above, including new claims 22 and 23.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Prince (US 5590654) discloses a technique and apparatus for monitoring and detecting the arrival of a contrast agent in a region of interest, which may be employed to facilitate synchronization between collecting the central portion of k-space image data with the arterial phase of contrast enhancement.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan G. Cwern whose telephone number is 571-270-1560. The examiner can normally be reached on Monday through Friday 9:30AM - 6:00PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Casler can be reached on 571-272-4956. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JC

/Ruth S. Smith/
Ruth S. Smith
Primary Examiner
Art Unit 3737